

WHAT IS CLAIMED IS:

1. An apparatus for inspecting a film carrier tape for mounting electronic component in which a plurality of electronic component mounting portions is provided in multiple stripes in a transverse direction, comprising:

an unwinding device for unwinding the film carrier tape for mounting electronic component in the multiple stripes in which the individual film carrier tapes for mounting electronic component previously cut and separated into the individual stripes are wound upon an unwinding reel, respectively;

an inspecting section for simultaneously inspecting the film carrier tapes for mounting electronic component, which are cut into the stripes, while causing them to run in parallel with each other; and

a take-up device for simultaneously taking up the film carrier tapes for mounting electronic component cut into the stripes, which are inspected in the inspecting section upon a plurality of take-up reels attached to an identical take-up shaft in parallel, respectively.

2. An apparatus for inspecting a film carrier tape for mounting electronic component in which a plurality of

electronic component mounting portions is provided in multiple stripes in a transverse direction, comprising:

an unwinding device for unwinding the film carrier tape for mounting electronic component in the multiple stripes in which the individual film carrier tapes for mounting electronic component previously cut into the stripes are wound upon an unwinding reel, respectively;

an inspecting section for simultaneously inspecting the film carrier tapes for mounting electronic component, which are cut into the stripes, while causing them to run in parallel with each other; and

a take-up device for simultaneously taking up the film carrier tapes for mounting electronic component cut into the stripes, which are inspected in the inspecting section, upon a plurality of take-up reels attached to separate take-up shafts in parallel, respectively.

3. An apparatus for inspecting a film carrier tape for mounting electronic component in which a plurality of electronic component mounting portions is provided in multiple stripes in a transverse direction, comprising:

an unwinding device for unwinding the film carrier tape for mounting electronic component in the multiple stripes which are wound upon an unwinding reel;

a slit device for cutting the film carrier tapes for mounting electronic component in the multiple stripes, which are unwound from the unwinding device, into individual film carrier tapes for mounting electronic component in stripes;

an inspecting section for causing the film carrier tapes for mounting electronic component, which are cut into the stripes by the slit device, to run in parallel with each other and simultaneously inspecting them; and

a take-up device for simultaneously taking up the film carrier tapes for mounting electronic component cut into the stripes, which are inspected in the inspecting section, upon a plurality of take-up reels attached to an identical take-up shaft in parallel, respectively.

4. An apparatus for inspecting a film carrier tape for mounting electronic component in which a plurality of electronic component mounting portions is provided in multiple stripes in a transverse direction, comprising:

an unwinding device for unwinding the film carrier tape for mounting electronic component in the multiple stripes which are wound upon an unwinding reel;

a slit device for cutting the film carrier tapes for mounting electronic component in the multiple stripes,

which are unwound from the unwinding device, into individual film carrier tapes for mounting electronic component in stripes;

an inspecting section for causing the film carrier
5 tapes for mounting electronic component, which are cut into the stripes by the slit device, to run in parallel with each other and simultaneously inspecting them; and

a take-up device for simultaneously taking up the film carrier tapes for mounting electronic component cut
10 into the stripes, which are inspected in the inspecting section, upon a plurality of take-up reels attached to separate take-up shafts in parallel, respectively.

5. The apparatus for inspecting a film carrier tape for
15 mounting electronic component according to any of claims 1 to 4, wherein the inspecting section includes a guide member for causing film carrier tapes for mounting electronic component, which are cut into stripes, to run in parallel with each other,

20 the guide member comprising:

a side guide portion on both ends which serves to guide both end side portions of the film carrier tape for mounting electronic component on an outermost side; and

an adjacent part guide portion, which is

protruded to guide adjacent side portions of the film carrier tapes for mounting electronic component cut into the stripes between the guide portions on the both ends.

5 6. The apparatus for inspecting a film carrier tape for mounting electronic component according to any of claims 1 to 5, further comprising a drive gear for conveying the film carrier tapes for mounting electronic component, which are unwound from the unwinding device and cut into the
10 stripes by the slit device, while causing them to run in parallel with each other,

the drive gear including:

a both end gear mated with a sprocket hole in side portions on both ends of the film carrier tape for
15 mounting electronic component on the outermost side; and

an intermediate gear mated with a sprocket hole provided in the adjacent side portions of the film carrier tape for mounting electronic component cut into the stripes between the both end gears.

20

7. The apparatus for inspecting a film carrier tape for mounting electronic component according to claim 6, further comprising a guide roller,

the guide roller including:

a side guide protruded portion on both ends which serves to guide both end side portions of the film carrier tape for mounting electronic component on the outermost side; and

5 an adjacent part guide protruded portion protruded to separate and guide adjacent side portions of the film carrier tapes for mounting electronic component cut into the stripes between the side guide protruded portions on the both ends.

10

8. The apparatus for inspecting a film carrier tape for mounting electronic component according to any of claims 1, 3 and 5 to 7, wherein a plurality of take-up reels, which are attached to the identical take-up shaft of the take-up device in parallel with each other, are fixed into through 15 holes provided in the vicinity of centers of the reels by means of removable engaging bar members.

9. The apparatus for inspecting a film carrier tape for 20 mounting electronic component according to any of claims 2 and 4 to 7, wherein a plurality of take-up reels, which are attached to the separate take-up shafts of the take-up device in parallel with each other, are fixed into through holes provided in the vicinity of centers of the reels by

means of removable engaging bar members, respectively.

10. The apparatus for inspecting a film carrier tape for mounting electronic component according to any of claims 1, 3 and 5 to 8, wherein the identical take-up shaft of the take-up device is constituted by an air shaft capable of expanding to increase a diameter thereof upon receipt of supply of air, and

a plurality of take-up reels attached to the take-up shaft in parallel with each other is thus fixed to each other.

11. The apparatus for inspecting a film carrier tape for mounting electronic component according to any of claims 2, 4 to 7 and 9, wherein the separate take-up shafts of the take-up device are constituted by an air shaft capable of expanding to increase a diameter thereof upon receipt of supply of air, and

a plurality of take-up reels attached to the take-up shaft in parallel with each other is thus fixed, respectively.

12. The apparatus for inspecting a film carrier tape for mounting electronic component according to any of claims 1

to 11, wherein the inspecting section includes a magnifying lens device for magnifying the film carrier tape for mounting electronic component in order to carry out an inspection,

5 the magnifying lens device including a magnifying lens for magnifying, in a total width direction, the film carrier tapes for mounting electronic component, which are cut into the stripes and running in parallel with each other.

10

13. The apparatus for inspecting a film carrier tape for mounting electronic component according to any of claims 1 to 12, wherein the magnifying lens device has a magnification of 1.4 or more at an enlargement ratio of a length.

15

14. The apparatus for inspecting a film carrier tape for mounting electronic component according to any of claims 1 to 13, wherein separate dancer rollers are provided for the film carrier tapes for mounting electronic component, which are cut into the stripes, between the unwinding device and the inspecting section, respectively.

20

15. The apparatus for inspecting a film carrier tape for

mounting electronic component according to any of claims 1
to 14, wherein separate dancer rollers are provided for the
film carrier tapes for mounting electronic component, which
are cut into the stripes, between the take-up device and
5 the inspecting section, respectively.

16. The apparatus for inspecting a film carrier tape for
mounting electronic component according to any of claims 1
to 13 and 15, wherein an identical dancer roller is
10 provided for the film carrier tapes for mounting electronic
component, which are cut into the stripes, between the
unwinding device and the inspecting section.

17. The apparatus for inspecting a film carrier tape for
15 mounting electronic component according to any of claims 1
to 14 and 16, wherein an identical dancer roller is
provided for the film carrier tapes for mounting electronic
component, which are cut into the stripes, between the
take-up device and the inspecting section.

20

18. The apparatus for inspecting a film carrier tape for
mounting electronic component according to any of claims 14
to 17, further comprising a looseness control device for
detecting a position of the dancer roller to control an

amount of looseness of the film carrier tape for mounting electronic component.

19. The apparatus for inspecting a film carrier tape for mounting electronic component, according to claim 18, wherein the looseness control device includes a guide member for separately changing a guide path for the film carrier tape for mounting electronic component in each stripe which is to be guided by the dancer roller.

10

20. A method for inspecting a film carrier tape for mounting electronic component in which a plurality of electronic component mounting portions is provided in multiple stripes in a transverse direction, comprising the steps of:

unwinding, from an unwinding device, the film carrier tape for mounting electronic component in the multiple stripes in which the individual film carrier tapes for mounting electronic component previously cut into the stripes are wound upon an unwinding reel, respectively;

simultaneously inspecting the film carrier tapes for mounting electronic component, which are cut into the stripes, in an inspecting section while causing them to run in parallel with each other; and

simultaneously taking up the film carrier tapes for mounting electronic component cut into the stripes, which are inspected in the inspecting section, upon a plurality of take-up reels attached to an identical take-up shaft of a take-up device in parallel, respectively.

21. A method for inspecting a film carrier tape for mounting electronic component in which a plurality of electronic component mounting portions is provided in multiple stripes in a transverse direction, comprising the steps of;

unwinding, from an unwinding device, the film carrier tape for mounting electronic component in the multiple stripes in which the individual film carrier tapes for mounting electronic component previously cut into the stripes are wound upon an unwinding reel, respectively;

simultaneously inspecting the film carrier tapes for mounting electronic component, which are cut into the stripes, in an inspecting section while causing them to run in parallel with each other; and

simultaneously taking up the film carrier tapes for mounting electronic component, which are cut into the stripes, which are inspected in the inspecting section, upon a plurality of take-up reels attached to separate

take-up shafts of a take-up device in parallel,
respectively.

22. A method for inspecting a film carrier tape for
5 mounting electronic component in which a plurality of
electronic component mounting portions is provided in
multiple stripes in a transverse direction, comprising the
steps of:

unwinding, from an unwinding device, the film carrier
10 tapes for mounting electronic component in the multiple
stripes which are wound upon an unwinding reel;

cutting the film carrier tapes for mounting
electronic component in the multiple stripes, which are
unwound from the unwinding device, into individual film
15 carrier tapes for mounting electronic component in stripes
by a slit device;

causing the film carrier tapes for mounting
electronic component, which are cut into the stripes by the
slit device, to run in parallel with each other and
20 simultaneously inspecting them in an inspecting section;
and

simultaneously taking up the film carrier tapes for
mounting electronic component cut into the stripes which
are inspected in the inspecting section, upon a plurality

of take-up reels attached to an identical take-up shaft of a take-up device in parallel, respectively.

23. A method for inspecting a film carrier tape for mounting electronic component in which a plurality of electronic component mounting portions is provided in multiple stripes in a transverse direction, comprising the steps of:

unwinding, from an unwinding device, the film carrier tape for mounting electronic component in the multiple stripes which are wound upon an unwinding reel;

cutting the film carrier tapes for mounting electronic component in the multiple stripes which are unwound from the unwinding device, into individual film carrier tapes for mounting electronic component in stripes by a slit device;

causing the film carrier tapes for mounting electronic component, which are cut into the stripes by the slit device, to run in parallel with each other and

simultaneously inspecting them in an inspecting section; and

simultaneously taking up the film carrier tapes for mounting electronic component cut into the stripes which are inspected in the inspecting section, upon a plurality

of take-up reels attached to separate take-up shafts of a take-up device in parallel, respectively.

24. The method for inspecting a film carrier tape for mounting electronic component according to any of claims 5 to 23, wherein the inspecting section includes a guide member for causing film carrier tapes for mounting electronic component, which are cut into stripes, to run in parallel with each other,

10 the guide member comprising:

a side guide portion on both ends which serves to guide both end side portions of the film carrier tape for mounting electronic component on an outermost side; and

an adjacent part guide portion, which is

15 protruded to guide adjacent side portions of the film carrier tapes for mounting electronic component cut into the stripes between the guide portions on the both ends.

25. The method for inspecting a film carrier tape for mounting electronic component according to any of claims 20 to 24, further comprising a drive gear for conveying the film carrier tapes for mounting electronic component, which are unwound from the unwinding device and cut into the stripes by the slit device, while causing them to run in

parallel with each other,

the drive gear including:

5 a both end gear mated with a sprocket hole in side portions on both ends of the film carrier tape for mounting electronic component on the outermost side; and

an intermediate gear mated with a sprocket hole provided in the adjacent side portions of the film carrier tape for mounting electronic component cut into the stripes between the both end gears.

10

26. The method for inspecting a film carrier tape for mounting electronic component according to claim 25, further comprising a guide roller,

the guide roller including:

15

a side guide protruded portion on both ends which serves to guide both end side portions of the film carrier tape for mounting electronic component on an outermost side; and

20 an adjacent part guide protruded portion protruded to separate and guide adjacent side portions of the film carrier tapes for mounting electronic component cut into the stripes between the side guide protruded portions on the both ends.

27. The method for inspecting a film carrier tape for mounting electronic component according to any of claims 20, 22 and 24 to 26, wherein a plurality of take-up reels, which are attached to the identical take-up shaft of the take-up device in parallel with each other, are fixed into through holes provided in the vicinity of centers of the reels by means of removable engaging bar members.

28. The method for inspecting a film carrier tape for mounting electronic component according to any of claims 21 and 23 to 26, wherein a plurality of take-up reels, which are attached to the separate take-up shafts of the take-up device in parallel with each other, are fixed into through holes provided in the vicinity of centers of the reels by means of removable engaging bar members, respectively.

29. The method for inspecting a film carrier tape for mounting electronic component according to any of claims 20, 22 and 24 to 27, wherein the identical take-up shaft of the take-up device is constituted by an air shaft capable of expanding to increase a diameter thereof upon receipt of supply or air, and

a plurality of take-up reels attached to the take-up shaft in parallel with each other is thus fixed to each

other.

30. The method for inspecting a film carrier tape for mounting electronic component according to any of claims 21, 23 to 26 and 28, wherein the separate take-up shafts of the take-up device are constituted by an air shaft capable of expanding to increase a diameter thereof upon receipt of supply of air, and

a plurality of take-up reels attached to the take-up shaft in parallel with each other is thus fixed, respectively.

31. The method for inspecting a film carrier tape for mounting electronic component according to any of claims 20 to 30, wherein the inspecting section includes an illuminating device for irradiating a light on the film carrier tape for mounting electronic component in order to carry out an inspection,

the illuminating device having two illuminating lamps, which are provided apart from each other and are serving to irradiate a light on an inspecting position from rearward and above to be simultaneously focused with respect to the film carrier tapes for mounting electronic component, which are cut into the stripes and run in parallel with each

other.

32. The method for inspecting a film carrier tape for mounting electronic component according to any of claims 20 to 31, wherein the inspecting section includes a magnifying lens device for magnifying the film carrier tape for mounting electronic component in order to carry out an inspection,

the magnifying lens device including a magnifying lens for magnifying, in a total width direction, the film carrier tapes for mounting electronic component, which are cut into the stripes and running in parallel with each other.

33. The method for inspecting a film carrier tape for mounting electronic component according to any of claims 20 to 32, wherein the magnifying lens device has a magnification of 1.4 or more at an enlargement ratio of a length.

20.

34. The method for inspecting a film carrier tape for mounting electronic component according to any of claims 20 to 33, wherein separate dancer rollers are provided for the film carrier tapes for mounting electronic component, which

are cut into the stripes, between the unwinding device and the inspecting section.

35. The method for inspecting a film carrier tape for mounting electronic component according to any of claims 20 to 34, wherein separate dancer rollers are provided for the film carrier tapes for mounting electronic component, which are cut into the stripes, between the take-up device and the inspecting section.

10

36. The method for inspecting a film carrier tape for mounting electronic component according to any of claims 20 to 33 and 35, wherein an identical dancer roller is provided for the film carrier tapes for mounting electronic component, which are cut into the stripes, between the unwinding device and the inspecting section.

15

37. The method for inspecting a film carrier tape for mounting electronic component according to any of claims 20 to 34 and 36, wherein an identical dancer roller is provided for the film carrier tapes for mounting electronic component, which are cut into the stripes, between the take-up device and the inspecting section.

20

38. The method for inspecting a film carrier tape for mounting electronic component according to any of claims 34 to 37, further comprising a looseness control device for detecting a position of the dancer roller to control an amount of looseness of the film carrier tape for mounting electronic component.

39. The method for inspecting a film carrier tape for mounting electronic component according to claim 38, wherein the looseness control device includes a guide member for separately changing a guide path for the film carrier tape for mounting electronic component in each stripe which is to be guided by the dancer roller.